

WHAT IS CLAIMED IS:

- 5 1. A motor comprising:
 a rotary shaft; and
 a bearing for radially supporting the rotary shaft,
wherein the bearing includes:
 a cylindrical rotary member connected to the
 rotary shaft; and
 a cylindrical fixed surface surrounding the rotary
 member, wherein the fixed surface is spaced from the
 rotary member by a predetermined distance, and wherein
 the material of the rotary member has a coefficient of
 thermal expansion that is smaller than that of the
 material of the fixed surface.
- 10 2. The motor according to claim 1, wherein the difference
 between the coefficient of thermal expansion of the material
 of the fixed surface and the coefficient of thermal
 expansion of the material of the rotary member is $1 \times 10^{-6}/^{\circ}\text{C}$
 or more.
- 15 3. The motor according to claim 1, wherein the material of
 the rotary member has a coefficient of thermal expansion
 that is $5 \times 10^{-6}/^{\circ}\text{C}$ or less.
- 20 4. The motor according to claim 3, wherein the fixed
 surface is made of a ceramic oxide material.
- 25 5. The motor according to claim 4, wherein the fixed
 surface is made of alumina or zirconia.
6. The motor according to claim 3, wherein the rotary
 member is made of a ceramic carbide material or a ceramic
 nitride material.

7. The motor according to claim 6, wherein the rotary member is made of silicon carbide or silicon nitride.

8. The motor according to claim 1, further comprising a case for accommodating the bearing, the rotary member, and the fixed surface, wherein the case has a slit.

9. A motor comprising:
a rotary shaft; and
a bearing for radially supporting the rotary shaft,
wherein the bearing includes:

a cylindrical rotary member connected to the rotary shaft; and

a cylindrical fixed surface surrounding the rotary member, wherein the fixed surface is spaced from the rotary member by a predetermined distance, and wherein the rotary member is made of a material having a coefficient of thermal expansion that is $5 \times 10^{-6}/^{\circ}\text{C}$ or less.

10. The motor according to claim 9, wherein the rotary member is made of a ceramic carbide material or a ceramic nitride material.

11. The motor according to claim 10, wherein the rotary member is made of silicon carbide or silicon nitride.

12. The motor according to claim 9, further comprising a case for accommodating the bearing, the rotary member, and the fixed surface, wherein the case has a slit.

13. A turbo-molecular pump comprising:
a housing;
a stator vane attached to the housing;

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a rotor vane rotated relative to the stator vane; and
a motor for driving the rotor vane, wherein the motor

includes:

a rotary shaft; and

a bearing for radially supporting the rotary
shaft, wherein the bearing includes:

a cylindrical rotary member connected to the
rotary shaft; and

a cylindrical fixed surface surrounding the
rotary member, wherein the fixed surface is spaced
from the rotary member by a predetermined
distance, and wherein the material of the rotary
member has a coefficient of thermal expansion that
is smaller than that of the material of the fixed
surface.

14. The pump according to claim 13, further comprising a
device for cooling the motor.

15. A turbo-molecular pump comprising:

a housing;

a stator vane attached to the housing;

a rotor vane rotated relative to the stator vane; and

a motor for driving the rotor vane, wherein the motor

includes:

a rotary shaft; and

a bearing for radially supporting the rotary
shaft, wherein the bearing includes:

a cylindrical rotary member connected to the
rotary shaft; and

a cylindrical fixed surface surrounding the
rotary member, wherein the fixed surface is spaced
from the rotary member by a predetermined
distance, and wherein the rotary member is made of

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a material having a coefficient of thermal expansion that is $5 \times 10^{-6}/^{\circ}\text{C}$ or less.

16. The pump according to claim 15, further comprising a device for cooling the motor.

5 17. A motor comprising:
a rotary shaft; and
a bearing for radially supporting the rotary shaft,
wherein the bearing includes:

10 a cylindrical rotary member connected to the
rotary shaft; and

15 a cylindrical fixed surface surrounding the rotary
member, wherein the fixed surface is spaced from the
rotary member by a predetermined distance, wherein at
least one of the rotary member and the fixed surface
has a dynamic pressure groove formed on a predetermined
first area defined on a surface opposing the other of
the rotary member and the fixed surface, and wherein at
least one of the rotary member and the fixed surface
20 has a seal groove formed on a predetermined second area
defined on a surface opposing the other one of the
rotary member and the fixed surface, the seal groove
being formed deeper than the dynamic pressure groove.

25 18. The motor according to claim 17, wherein the depth of
the seal groove is within a range of two to ten times the
predetermined distance.

19. The motor according to claim 18, wherein the depth of
the dynamic pressure groove is within a range of one to five
times the predetermined distance.

20. The motor according to claim 17, wherein at least one

of the rotary member and the fixed surface has an annular groove formed between the first predetermined area and the second predetermined area, wherein the annular groove is deeper than the seal groove.

5 21. The motor according to claim 20, wherein the depth of the annular groove is within a range of three to fifteen times the predetermined distance.

10 22. The motor according to claim 20, wherein the depth of the annular groove is substantially equal to the depth of the seal groove and the depth of the dynamic pressure groove.

23. The motor according to claim 17, wherein the seal groove is helical.

15 24. A turbo-molecular pump comprising:
a housing;
a stator vane attached to the housing;
a rotor vane rotated relative to the stator vane; and
a motor for driving the rotor vane, wherein the motor includes:

20 a rotary shaft; and
a bearing for radially supporting the rotary shaft, wherein the bearing includes:

a cylindrical rotary member connected to the rotary shaft; and

25 a cylindrical fixed surface surrounding the rotary member, wherein the fixed surface is spaced from the rotary member by a predetermined distance, wherein at least one of the rotary member and the fixed surface has a dynamic
30 pressure groove defined on a surface opposing the

other of the rotary member and the fixed surface,
and wherein at least one of the rotary member and
the fixed surface has a first seal groove formed
on a surface opposing the other of the rotary
member and the fixed surface, the first seal
groove being formed deeper than the dynamic
pressure groove.

25. The pump according to claim 24, wherein the motor
includes a generally cylindrical case, wherein the pump
further comprises a cup-like wheel coupled to a distal end
of the rotary shaft to cover the case and support the rotor
vane, the wheel having an inner cylindrical surface that is
separated from an outer cylindrical of the case during
operation of the motor, and wherein at least one of the
wheel and the case has a second seal groove formed on a
surface opposing the other of the wheel and the case.

26. The pump according to claim 25, wherein the second seal
groove is helical.

27. The pump according to claim 24, wherein the motor is
elastically supported by the housing via an elastic member.

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